RWorksheet4c_Camayodo

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df_document

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1. a. Show your solutions on how to import a csv file into the environment.

```
library(readr)

open_mpg <- read.csv("mpg.csv")
open_mpg
```

```
##      X manufacturer                model displ year cyl      trans drv cty
## 1    1         audi                   a4   1.8 1999   4   auto(l5)   f  18
## 2    2         audi                   a4   1.8 1999   4 manual(m5)   f  21
## 3    3         audi                   a4   2.0 2008   4 manual(m6)   f  20
## 4    4         audi                   a4   2.0 2008   4   auto(av)   f  21
## 5    5         audi                   a4   2.8 1999   6   auto(l5)   f  16
## 6    6         audi                   a4   2.8 1999   6 manual(m5)   f  18
## 7    7         audi                   a4   3.1 2008   6   auto(av)   f  18
## 8    8         audi           a4 quattro   1.8 1999   4 manual(m5)   4  18
## 9    9         audi           a4 quattro   1.8 1999   4   auto(l5)   4  16
## 10  10         audi           a4 quattro   2.0 2008   4 manual(m6)   4  20
## 11  11         audi           a4 quattro   2.0 2008   4   auto(s6)   4  19
## 12  12         audi           a4 quattro   2.8 1999   6   auto(l5)   4  15
## 13  13         audi           a4 quattro   2.8 1999   6 manual(m5)   4  17
## 14  14         audi           a4 quattro   3.1 2008   6   auto(s6)   4  17
## 15  15         audi           a4 quattro   3.1 2008   6 manual(m6)   4  15
## 16  16         audi           a6 quattro   2.8 1999   6   auto(l5)   4  15
## 17  17         audi           a6 quattro   3.1 2008   6   auto(s6)   4  17
## 18  18         audi           a6 quattro   4.2 2008   8   auto(s6)   4  16
## 19  19    chevrolet   c1500 suburban 2wd   5.3 2008   8   auto(l4)   r  14
## 20  20    chevrolet   c1500 suburban 2wd   5.3 2008   8   auto(l4)   r  11
## 21  21    chevrolet   c1500 suburban 2wd   5.3 2008   8   auto(l4)   r  14
## 22  22    chevrolet   c1500 suburban 2wd   5.7 1999   8   auto(l4)   r  13
## 23  23    chevrolet   c1500 suburban 2wd   6.0 2008   8   auto(l4)   r  12
## 24  24    chevrolet             corvette   5.7 1999   8 manual(m6)   r  16
## 25  25    chevrolet             corvette   5.7 1999   8   auto(l4)   r  15
## 26  26    chevrolet             corvette   6.2 2008   8 manual(m6)   r  16
## 27  27    chevrolet             corvette   6.2 2008   8   auto(s6)   r  15
## 28  28    chevrolet             corvette   7.0 2008   8 manual(m6)   r  15
## 29  29    chevrolet      k1500 tahoe 4wd   5.3 2008   8   auto(l4)   4  14
## 30  30    chevrolet      k1500 tahoe 4wd   5.3 2008   8   auto(l4)   4  11
## 31  31    chevrolet      k1500 tahoe 4wd   5.7 1999   8   auto(l4)   4  11
## 32  32    chevrolet      k1500 tahoe 4wd   6.5 1999   8   auto(l4)   4  14
```

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## 33 33   chevrolet               malibu 2.4 1999 4  auto(l4) f 19
## 34 34   chevrolet               malibu 2.4 2008 4  auto(l4) f 22
## 35 35   chevrolet               malibu 3.1 1999 6  auto(l4) f 18
## 36 36   chevrolet               malibu 3.5 2008 6  auto(l4) f 18
## 37 37   chevrolet               malibu 3.6 2008 6  auto(s6) f 17
## 38 38       dodge          caravan 2wd 2.4 1999 4  auto(l3) f 18
## 39 39       dodge          caravan 2wd 3.0 1999 6  auto(l4) f 17
## 40 40       dodge          caravan 2wd 3.3 1999 6  auto(l4) f 16
## 41 41       dodge          caravan 2wd 3.3 1999 6  auto(l4) f 16
## 42 42       dodge          caravan 2wd 3.3 2008 6  auto(l4) f 17
## 43 43       dodge          caravan 2wd 3.3 2008 6  auto(l4) f 17
## 44 44       dodge          caravan 2wd 3.3 2008 6  auto(l4) f 11
## 45 45       dodge          caravan 2wd 3.8 1999 6  auto(l4) f 15
## 46 46       dodge          caravan 2wd 3.8 1999 6  auto(l4) f 15
## 47 47       dodge          caravan 2wd 3.8 2008 6  auto(l6) f 16
## 48 48       dodge          caravan 2wd 4.0 2008 6  auto(l6) f 16
## 49 49       dodge     dakota pickup 4wd 3.7 2008 6 manual(m6) 4 15
## 50 50       dodge     dakota pickup 4wd 3.7 2008 6  auto(l4) 4 14
## 51 51       dodge     dakota pickup 4wd 3.9 1999 6  auto(l4) 4 13
## 52 52       dodge     dakota pickup 4wd 3.9 1999 6 manual(m5) 4 14
## 53 53       dodge     dakota pickup 4wd 4.7 2008 8  auto(l5) 4 14
## 54 54       dodge     dakota pickup 4wd 4.7 2008 8  auto(l5) 4 14
## 55 55       dodge     dakota pickup 4wd 4.7 2008 8  auto(l5) 4  9
## 56 56       dodge     dakota pickup 4wd 5.2 1999 8 manual(m5) 4 11
## 57 57       dodge     dakota pickup 4wd 5.2 1999 8  auto(l4) 4 11
## 58 58       dodge          durango 4wd 3.9 1999 6  auto(l4) 4 13
## 59 59       dodge          durango 4wd 4.7 2008 8  auto(l5) 4 13
## 60 60       dodge          durango 4wd 4.7 2008 8  auto(l5) 4  9
## 61 61       dodge          durango 4wd 4.7 2008 8  auto(l5) 4 13
## 62 62       dodge          durango 4wd 5.2 1999 8  auto(l4) 4 11
## 63 63       dodge          durango 4wd 5.7 2008 8  auto(l5) 4 13
## 64 64       dodge          durango 4wd 5.9 1999 8  auto(l4) 4 11
## 65 65       dodge   ram 1500 pickup 4wd 4.7 2008 8 manual(m6) 4 12
## 66 66       dodge   ram 1500 pickup 4wd 4.7 2008 8  auto(l5) 4  9
## 67 67       dodge   ram 1500 pickup 4wd 4.7 2008 8  auto(l5) 4 13
## 68 68       dodge   ram 1500 pickup 4wd 4.7 2008 8  auto(l5) 4 13
## 69 69       dodge   ram 1500 pickup 4wd 4.7 2008 8 manual(m6) 4 12
## 70 70       dodge   ram 1500 pickup 4wd 4.7 2008 8 manual(m6) 4  9
## 71 71       dodge   ram 1500 pickup 4wd 5.2 1999 8  auto(l4) 4 11
## 72 72       dodge   ram 1500 pickup 4wd 5.2 1999 8 manual(m5) 4 11
## 73 73       dodge   ram 1500 pickup 4wd 5.7 2008 8  auto(l5) 4 13
## 74 74       dodge   ram 1500 pickup 4wd 5.9 1999 8  auto(l4) 4 11
## 75 75        ford       expedition 2wd 4.6 1999 8  auto(l4) r 11
## 76 76        ford       expedition 2wd 5.4 1999 8  auto(l4) r 11
## 77 77        ford       expedition 2wd 5.4 2008 8  auto(l6) r 12
## 78 78        ford         explorer 4wd 4.0 1999 6  auto(l5) 4 14
## 79 79        ford         explorer 4wd 4.0 1999 6 manual(m5) 4 15
## 80 80        ford         explorer 4wd 4.0 1999 6  auto(l5) 4 14
## 81 81        ford         explorer 4wd 4.0 2008 6  auto(l5) 4 13
## 82 82        ford         explorer 4wd 4.6 2008 8  auto(l6) 4 13
## 83 83        ford         explorer 4wd 5.0 1999 8  auto(l4) 4 13
## 84 84        ford      f150 pickup 4wd 4.2 1999 6  auto(l4) 4 14
## 85 85        ford      f150 pickup 4wd 4.2 1999 6 manual(m5) 4 14
## 86 86        ford      f150 pickup 4wd 4.6 1999 8 manual(m5) 4 13
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## 87   87       ford    f150 pickup 4wd 4.6 1999 8   auto(14) 4 13
## 88   88       ford    f150 pickup 4wd 4.6 2008 8   auto(14) 4 13
## 89   89       ford    f150 pickup 4wd 5.4 1999 8   auto(14) 4 11
## 90   90       ford    f150 pickup 4wd 5.4 2008 8   auto(14) 4 13
## 91   91       ford            mustang 3.8 1999 6 manual(m5) r 18
## 92   92       ford            mustang 3.8 1999 6   auto(14) r 18
## 93   93       ford            mustang 4.0 2008 6 manual(m5) r 17
## 94   94       ford            mustang 4.0 2008 6   auto(15) r 16
## 95   95       ford            mustang 4.6 1999 8   auto(14) r 15
## 96   96       ford            mustang 4.6 1999 8 manual(m5) r 15
## 97   97       ford            mustang 4.6 2008 8 manual(m5) r 15
## 98   98       ford            mustang 4.6 2008 8   auto(15) r 15
## 99   99       ford            mustang 5.4 2008 8 manual(m6) r 14
## 100 100      honda              civic 1.6 1999 4 manual(m5) f 28
## 101 101      honda              civic 1.6 1999 4   auto(14) f 24
## 102 102      honda              civic 1.6 1999 4 manual(m5) f 25
## 103 103      honda              civic 1.6 1999 4 manual(m5) f 23
## 104 104      honda              civic 1.6 1999 4   auto(14) f 24
## 105 105      honda              civic 1.8 2008 4 manual(m5) f 26
## 106 106      honda              civic 1.8 2008 4   auto(15) f 25
## 107 107      honda              civic 1.8 2008 4   auto(15) f 24
## 108 108      honda              civic 2.0 2008 4 manual(m6) f 21
## 109 109    hyundai             sonata 2.4 1999 4   auto(14) f 18
## 110 110    hyundai             sonata 2.4 1999 4 manual(m5) f 18
## 111 111    hyundai             sonata 2.4 2008 4   auto(14) f 21
## 112 112    hyundai             sonata 2.4 2008 4 manual(m5) f 21
## 113 113    hyundai             sonata 2.5 1999 6   auto(14) f 18
## 114 114    hyundai             sonata 2.5 1999 6 manual(m5) f 18
## 115 115    hyundai             sonata 3.3 2008 6   auto(15) f 19
## 116 116    hyundai            tiburon 2.0 1999 4   auto(14) f 19
## 117 117    hyundai            tiburon 2.0 1999 4 manual(m5) f 19
## 118 118    hyundai            tiburon 2.0 2008 4 manual(m5) f 20
## 119 119    hyundai            tiburon 2.0 2008 4   auto(14) f 20
## 120 120    hyundai            tiburon 2.7 2008 6   auto(14) f 17
## 121 121    hyundai            tiburon 2.7 2008 6 manual(m6) f 16
## 122 122    hyundai            tiburon 2.7 2008 6 manual(m5) f 17
## 123 123       jeep grand cherokee 4wd 3.0 2008 6   auto(15) 4 17
## 124 124       jeep grand cherokee 4wd 3.7 2008 6   auto(15) 4 15
## 125 125       jeep grand cherokee 4wd 4.0 1999 6   auto(14) 4 15
## 126 126       jeep grand cherokee 4wd 4.7 1999 8   auto(14) 4 14
## 127 127       jeep grand cherokee 4wd 4.7 2008 8   auto(15) 4  9
## 128 128       jeep grand cherokee 4wd 4.7 2008 8   auto(15) 4 14
## 129 129       jeep grand cherokee 4wd 5.7 2008 8   auto(15) 4 13
## 130 130       jeep grand cherokee 4wd 6.1 2008 8   auto(15) 4 11
## 131 131 land rover         range rover 4.0 1999 8   auto(14) 4 11
## 132 132 land rover         range rover 4.2 2008 8   auto(s6) 4 12
## 133 133 land rover         range rover 4.4 2008 8   auto(s6) 4 12
## 134 134 land rover         range rover 4.6 1999 8   auto(14) 4 11
## 135 135    lincoln      navigator 2wd 5.4 1999 8   auto(14) r 11
## 136 136    lincoln      navigator 2wd 5.4 1999 8   auto(14) r 11
## 137 137    lincoln      navigator 2wd 5.4 2008 8   auto(16) r 12
## 138 138    mercury    mountaineer 4wd 4.0 1999 6   auto(15) 4 14
## 139 139    mercury    mountaineer 4wd 4.0 2008 6   auto(15) 4 13
## 140 140    mercury    mountaineer 4wd 4.6 2008 8   auto(16) 4 13
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## 141 141    mercury   mountaineer 4wd  5.0 1999  8   auto(l4)  4  13
## 142 142     nissan            altima  2.4 1999  4 manual(m5)  f  21
## 143 143     nissan            altima  2.4 1999  4   auto(l4)  f  19
## 144 144     nissan            altima  2.5 2008  4   auto(av)  f  23
## 145 145     nissan            altima  2.5 2008  4 manual(m6)  f  23
## 146 146     nissan            altima  3.5 2008  6 manual(m6)  f  19
## 147 147     nissan            altima  3.5 2008  6   auto(av)  f  19
## 148 148     nissan            maxima  3.0 1999  6   auto(l4)  f  18
## 149 149     nissan            maxima  3.0 1999  6 manual(m5)  f  19
## 150 150     nissan            maxima  3.5 2008  6   auto(av)  f  19
## 151 151     nissan     pathfinder 4wd  3.3 1999  6   auto(l4)  4  14
## 152 152     nissan     pathfinder 4wd  3.3 1999  6 manual(m5)  4  15
## 153 153     nissan     pathfinder 4wd  4.0 2008  6   auto(l5)  4  14
## 154 154     nissan     pathfinder 4wd  5.6 2008  8   auto(s5)  4  12
## 155 155    pontiac         grand prix  3.1 1999  6   auto(l4)  f  18
## 156 156    pontiac         grand prix  3.8 1999  6   auto(l4)  f  16
## 157 157    pontiac         grand prix  3.8 1999  6   auto(l4)  f  17
## 158 158    pontiac         grand prix  3.8 2008  6   auto(l4)  f  18
## 159 159    pontiac         grand prix  5.3 2008  8   auto(s4)  f  16
## 160 160     subaru       forester awd  2.5 1999  4 manual(m5)  4  18
## 161 161     subaru       forester awd  2.5 1999  4   auto(l4)  4  18
## 162 162     subaru       forester awd  2.5 2008  4 manual(m5)  4  20
## 163 163     subaru       forester awd  2.5 2008  4 manual(m5)  4  19
## 164 164     subaru       forester awd  2.5 2008  4   auto(l4)  4  20
## 165 165     subaru       forester awd  2.5 2008  4   auto(l4)  4  18
## 166 166     subaru        impreza awd  2.2 1999  4   auto(l4)  4  21
## 167 167     subaru        impreza awd  2.2 1999  4 manual(m5)  4  19
## 168 168     subaru        impreza awd  2.5 1999  4 manual(m5)  4  19
## 169 169     subaru        impreza awd  2.5 1999  4   auto(l4)  4  19
## 170 170     subaru        impreza awd  2.5 2008  4   auto(s4)  4  20
## 171 171     subaru        impreza awd  2.5 2008  4   auto(s4)  4  20
## 172 172     subaru        impreza awd  2.5 2008  4 manual(m5)  4  19
## 173 173     subaru        impreza awd  2.5 2008  4 manual(m5)  4  20
## 174 174     toyota        4runner 4wd  2.7 1999  4 manual(m5)  4  15
## 175 175     toyota        4runner 4wd  2.7 1999  4   auto(l4)  4  16
## 176 176     toyota        4runner 4wd  3.4 1999  6   auto(l4)  4  15
## 177 177     toyota        4runner 4wd  3.4 1999  6 manual(m5)  4  15
## 178 178     toyota        4runner 4wd  4.0 2008  6   auto(l5)  4  16
## 179 179     toyota        4runner 4wd  4.7 2008  8   auto(l5)  4  14
## 180 180     toyota             camry  2.2 1999  4 manual(m5)  f  21
## 181 181     toyota             camry  2.2 1999  4   auto(l4)  f  21
## 182 182     toyota             camry  2.4 2008  4 manual(m5)  f  21
## 183 183     toyota             camry  2.4 2008  4   auto(l5)  f  21
## 184 184     toyota             camry  3.0 1999  6   auto(l4)  f  18
## 185 185     toyota             camry  3.0 1999  6 manual(m5)  f  18
## 186 186     toyota             camry  3.5 2008  6   auto(s6)  f  19
## 187 187     toyota      camry solara  2.2 1999  4   auto(l4)  f  21
## 188 188     toyota      camry solara  2.2 1999  4 manual(m5)  f  21
## 189 189     toyota      camry solara  2.4 2008  4 manual(m5)  f  21
## 190 190     toyota      camry solara  2.4 2008  4   auto(s5)  f  22
## 191 191     toyota      camry solara  3.0 1999  6   auto(l4)  f  18
## 192 192     toyota      camry solara  3.0 1999  6 manual(m5)  f  18
## 193 193     toyota      camry solara  3.3 2008  6   auto(s5)  f  18
## 194 194     toyota            corolla  1.8 1999  4   auto(l3)  f  24
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## 195 195          toyota            corolla 1.8 1999 4    auto(l4) f 24
## 196 196          toyota            corolla 1.8 1999 4 manual(m5) f 26
## 197 197          toyota            corolla 1.8 2008 4 manual(m5) f 28
## 198 198          toyota            corolla 1.8 2008 4    auto(l4) f 26
## 199 199          toyota land cruiser wagon 4wd 4.7 1999 8    auto(l4) 4 11
## 200 200          toyota land cruiser wagon 4wd 5.7 2008 8    auto(s6) 4 13
## 201 201          toyota   toyota tacoma 4wd 2.7 1999 4 manual(m5) 4 15
## 202 202          toyota   toyota tacoma 4wd 2.7 1999 4    auto(l4) 4 16
## 203 203          toyota   toyota tacoma 4wd 2.7 2008 4 manual(m5) 4 17
## 204 204          toyota   toyota tacoma 4wd 3.4 1999 6 manual(m5) 4 15
## 205 205          toyota   toyota tacoma 4wd 3.4 1999 6    auto(l4) 4 15
## 206 206          toyota   toyota tacoma 4wd 4.0 2008 6 manual(m6) 4 15
## 207 207          toyota   toyota tacoma 4wd 4.0 2008 6    auto(l5) 4 16
## 208 208      volkswagen               gti 2.0 1999 4 manual(m5) f 21
## 209 209      volkswagen               gti 2.0 1999 4    auto(l4) f 19
## 210 210      volkswagen               gti 2.0 2008 4 manual(m6) f 21
## 211 211      volkswagen               gti 2.0 2008 4    auto(s6) f 22
## 212 212      volkswagen               gti 2.8 1999 6 manual(m5) f 17
## 213 213      volkswagen             jetta 1.9 1999 4 manual(m5) f 33
## 214 214      volkswagen             jetta 2.0 1999 4 manual(m5) f 21
## 215 215      volkswagen             jetta 2.0 1999 4    auto(l4) f 19
## 216 216      volkswagen             jetta 2.0 2008 4    auto(s6) f 22
## 217 217      volkswagen             jetta 2.0 2008 4 manual(m6) f 21
## 218 218      volkswagen             jetta 2.5 2008 5    auto(s6) f 21
## 219 219      volkswagen             jetta 2.5 2008 5 manual(m5) f 21
## 220 220      volkswagen             jetta 2.8 1999 6    auto(l4) f 16
## 221 221      volkswagen             jetta 2.8 1999 6 manual(m5) f 17
## 222 222      volkswagen        new beetle 1.9 1999 4 manual(m5) f 35
## 223 223      volkswagen        new beetle 1.9 1999 4    auto(l4) f 29
## 224 224      volkswagen        new beetle 2.0 1999 4 manual(m5) f 21
## 225 225      volkswagen        new beetle 2.0 1999 4    auto(l4) f 19
## 226 226      volkswagen        new beetle 2.5 2008 5 manual(m5) f 20
## 227 227      volkswagen        new beetle 2.5 2008 5    auto(s6) f 20
## 228 228      volkswagen            passat 1.8 1999 4 manual(m5) f 21
## 229 229      volkswagen            passat 1.8 1999 4    auto(l5) f 18
## 230 230      volkswagen            passat 2.0 2008 4    auto(s6) f 19
## 231 231      volkswagen            passat 2.0 2008 4 manual(m6) f 21
## 232 232      volkswagen            passat 2.8 1999 6    auto(l5) f 16
## 233 233      volkswagen            passat 2.8 1999 6 manual(m5) f 18
## 234 234      volkswagen            passat 3.6 2008 6    auto(s6) f 17
##     hwy fl    class
## 1    29  p  compact
## 2    29  p  compact
## 3    31  p  compact
## 4    30  p  compact
## 5    26  p  compact
## 6    26  p  compact
## 7    27  p  compact
## 8    26  p  compact
## 9    25  p  compact
## 10   28  p  compact
## 11   27  p  compact
## 12   25  p  compact
## 13   25  p  compact
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## 14    25    p    compact
## 15    25    p    compact
## 16    24    p    midsize
## 17    25    p    midsize
## 18    23    p    midsize
## 19    20    r        suv
## 20    15    e        suv
## 21    20    r        suv
## 22    17    r        suv
## 23    17    r        suv
## 24    26    p    2seater
## 25    23    p    2seater
## 26    26    p    2seater
## 27    25    p    2seater
## 28    24    p    2seater
## 29    19    r        suv
## 30    14    e        suv
## 31    15    r        suv
## 32    17    d        suv
## 33    27    r    midsize
## 34    30    r    midsize
## 35    26    r    midsize
## 36    29    r    midsize
## 37    26    r    midsize
## 38    24    r    minivan
## 39    24    r    minivan
## 40    22    r    minivan
## 41    22    r    minivan
## 42    24    r    minivan
## 43    24    r    minivan
## 44    17    e    minivan
## 45    22    r    minivan
## 46    21    r    minivan
## 47    23    r    minivan
## 48    23    r    minivan
## 49    19    r     pickup
## 50    18    r     pickup
## 51    17    r     pickup
## 52    17    r     pickup
## 53    19    r     pickup
## 54    19    r     pickup
## 55    12    e     pickup
## 56    17    r     pickup
## 57    15    r     pickup
## 58    17    r        suv
## 59    17    r        suv
## 60    12    e        suv
## 61    17    r        suv
## 62    16    r        suv
## 63    18    r        suv
## 64    15    r        suv
## 65    16    r     pickup
## 66    12    e     pickup
## 67    17    r     pickup
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## 68   17  r    pickup
## 69   16  r    pickup
## 70   12  e    pickup
## 71   15  r    pickup
## 72   16  r    pickup
## 73   17  r    pickup
## 74   15  r    pickup
## 75   17  r       suv
## 76   17  r       suv
## 77   18  r       suv
## 78   17  r       suv
## 79   19  r       suv
## 80   17  r       suv
## 81   19  r       suv
## 82   19  r       suv
## 83   17  r       suv
## 84   17  r    pickup
## 85   17  r    pickup
## 86   16  r    pickup
## 87   16  r    pickup
## 88   17  r    pickup
## 89   15  r    pickup
## 90   17  r    pickup
## 91   26  r subcompact
## 92   25  r subcompact
## 93   26  r subcompact
## 94   24  r subcompact
## 95   21  r subcompact
## 96   22  r subcompact
## 97   23  r subcompact
## 98   22  r subcompact
## 99   20  p subcompact
## 100  33  r subcompact
## 101  32  r subcompact
## 102  32  r subcompact
## 103  29  p subcompact
## 104  32  r subcompact
## 105  34  r subcompact
## 106  36  r subcompact
## 107  36  c subcompact
## 108  29  p subcompact
## 109  26  r   midsize
## 110  27  r   midsize
## 111  30  r   midsize
## 112  31  r   midsize
## 113  26  r   midsize
## 114  26  r   midsize
## 115  28  r   midsize
## 116  26  r subcompact
## 117  29  r subcompact
## 118  28  r subcompact
## 119  27  r subcompact
## 120  24  r subcompact
## 121  24  r subcompact
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## 122  24  r subcompact
## 123  22  d        suv
## 124  19  r        suv
## 125  20  r        suv
## 126  17  r        suv
## 127  12  e        suv
## 128  19  r        suv
## 129  18  r        suv
## 130  14  p        suv
## 131  15  p        suv
## 132  18  r        suv
## 133  18  r        suv
## 134  15  p        suv
## 135  17  r        suv
## 136  16  p        suv
## 137  18  r        suv
## 138  17  r        suv
## 139  19  r        suv
## 140  19  r        suv
## 141  17  r        suv
## 142  29  r    compact
## 143  27  r    compact
## 144  31  r    midsize
## 145  32  r    midsize
## 146  27  p    midsize
## 147  26  p    midsize
## 148  26  r    midsize
## 149  25  r    midsize
## 150  25  p    midsize
## 151  17  r        suv
## 152  17  r        suv
## 153  20  p        suv
## 154  18  p        suv
## 155  26  r    midsize
## 156  26  p    midsize
## 157  27  r    midsize
## 158  28  r    midsize
## 159  25  p    midsize
## 160  25  r        suv
## 161  24  r        suv
## 162  27  r        suv
## 163  25  p        suv
## 164  26  r        suv
## 165  23  p        suv
## 166  26  r subcompact
## 167  26  r subcompact
## 168  26  r subcompact
## 169  26  r subcompact
## 170  25  p    compact
## 171  27  r    compact
## 172  25  p    compact
## 173  27  r    compact
## 174  20  r        suv
## 175  20  r        suv
```

```
## 176  19  r        suv
## 177  17  r        suv
## 178  20  r        suv
## 179  17  r        suv
## 180  29  r    midsize
## 181  27  r    midsize
## 182  31  r    midsize
## 183  31  r    midsize
## 184  26  r    midsize
## 185  26  r    midsize
## 186  28  r    midsize
## 187  27  r    compact
## 188  29  r    compact
## 189  31  r    compact
## 190  31  r    compact
## 191  26  r    compact
## 192  26  r    compact
## 193  27  r    compact
## 194  30  r    compact
## 195  33  r    compact
## 196  35  r    compact
## 197  37  r    compact
## 198  35  r    compact
## 199  15  r        suv
## 200  18  r        suv
## 201  20  r     pickup
## 202  20  r     pickup
## 203  22  r     pickup
## 204  17  r     pickup
## 205  19  r     pickup
## 206  18  r     pickup
## 207  20  r     pickup
## 208  29  r    compact
## 209  26  r    compact
## 210  29  p    compact
## 211  29  p    compact
## 212  24  r    compact
## 213  44  d    compact
## 214  29  r    compact
## 215  26  r    compact
## 216  29  p    compact
## 217  29  p    compact
## 218  29  r    compact
## 219  29  r    compact
## 220  23  r    compact
## 221  24  r    compact
## 222  44  d subcompact
## 223  41  d subcompact
## 224  29  r subcompact
## 225  26  r subcompact
## 226  28  r subcompact
## 227  29  r subcompact
## 228  29  p    midsize
## 229  29  p    midsize
```

```
## 230  28  p    midsize
## 231  29  p    midsize
## 232  26  p    midsize
## 233  26  p    midsize
## 234  26  p    midsize
```

1b. Which variables from mpg dataset are categorical?

```
str(open_mpg)
```

```
## 'data.frame':    234 obs. of  12 variables:
##  $ X           : int  1 2 3 4 5 6 7 8 9 10 ...
##  $ manufacturer: chr  "audi" "audi" "audi" "audi" ...
##  $ model       : chr  "a4" "a4" "a4" "a4" ...
##  $ displ       : num  1.8 1.8 2 2 2.8 2.8 3.1 1.8 1.8 2 ...
##  $ year        : int  1999 1999 2008 2008 1999 1999 2008 1999 1999 2008 ...
##  $ cyl         : int  4 4 4 4 6 6 6 4 4 4 ...
##  $ trans       : chr  "auto(l5)" "manual(m5)" "manual(m6)" "auto(av)" ...
##  $ drv         : chr  "f" "f" "f" "f" ...
##  $ cty         : int  18 21 20 21 16 18 18 18 16 20 ...
##  $ hwy         : int  29 29 31 30 26 26 27 26 25 28 ...
##  $ fl          : chr  "p" "p" "p" "p" ...
##  $ class       : chr  "compact" "compact" "compact" "compact" ...
```

ans. manufacturer, model, trans, drv, fl, class variables are categorical

1c. Which are continuous variables? ans. X, displ, year, cyl, cty, hwy are continuous variables?

2. Which manufacturer has the most models in this data set? Which model has the most variations? Show your answer.

```
manufacturer_counts <- table(open_mpg$manufacturer)



most_models_manufacturer <- as.character(names(manufacturer_counts)[which.max(manufacturer_counts)])


model_counts <- table(open_mpg$model)


most_variations_model <- as.character(names(model_counts)[which.max(model_counts)])


print(paste("The manufacturer with the most models is:", most_models_manufacturer))
```

```
## [1] "The manufacturer with the most models is: dodge"
```

```
print(paste("The model with the most variations is:", most_variations_model))
```

```
## [1] "The model with the most variations is: caravan 2wd"
```

2a. What does ggplot(mpg, aes(model, manufacturer)) + geom_point() show?

```
dfmpg <- data.frame(Manufacturer = open_mpg$manufacturer, Model = open_mpg$model)
unique_mpg <- unique(dfmpg)
unique_mpg
```

```
##      Manufacturer                 Model
```

```
## 1             audi                        a4
## 8             audi                 a4 quattro
## 16            audi                 a6 quattro
## 19       chevrolet       c1500 suburban 2wd
## 24       chevrolet                  corvette
## 29       chevrolet           k1500 tahoe 4wd
## 33       chevrolet                    malibu
## 38           dodge               caravan 2wd
## 49           dodge        dakota pickup 4wd
## 58           dodge               durango 4wd
## 65           dodge      ram 1500 pickup 4wd
## 75            ford            expedition 2wd
## 78            ford               explorer 4wd
## 84            ford          f150 pickup 4wd
## 91            ford                   mustang
## 100          honda                     civic
## 109        hyundai                    sonata
## 116        hyundai                   tiburon
## 123           jeep       grand cherokee 4wd
## 131     land rover               range rover
## 135        lincoln             navigator 2wd
## 138        mercury         mountaineer 4wd
## 142         nissan                    altima
## 148         nissan                    maxima
## 151         nissan           pathfinder 4wd
## 155        pontiac                grand prix
## 160         subaru             forester awd
## 166         subaru                impreza awd
## 174         toyota              4runner 4wd
## 180         toyota                     camry
## 187         toyota             camry solara
## 194         toyota                   corolla
## 199         toyota land cruiser wagon 4wd
## 201         toyota        toyota tacoma 4wd
## 208     volkswagen                       gti
## 213     volkswagen                     jetta
## 222     volkswagen                new beetle
## 228     volkswagen                    passat
```

2b. For you, is it useful? If not, how could you modify the data to make it more informative?

```r
library(ggplot2)

factoredManufacturer <- as.factor(unique_mpg$Manufacturer)
manufacturerPlot <- plot(as.factor(factoredManufacturer),
             main = "Unique Model per Manufacturer",
             cex.names = 0.8, las = 2)
```

Unique Model per Manufacturer
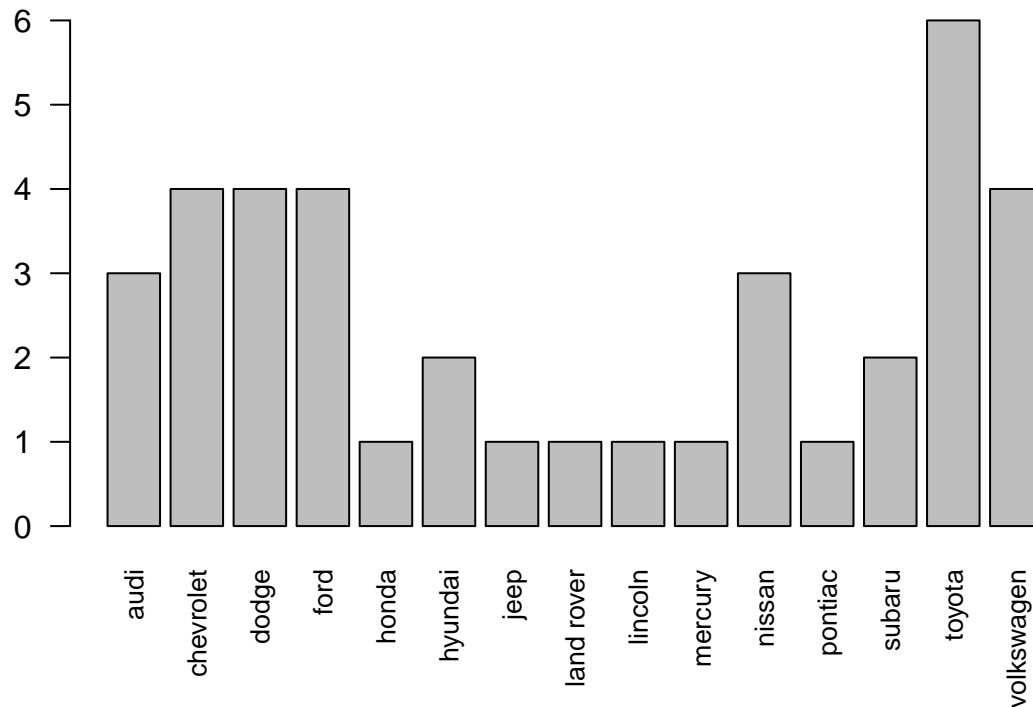

```
library(dplyr)
```

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
unique_count <- unique_mpg %>%
  count(unique_mpg$Manufacturer)
unique_count
```

```
##     unique_mpg$Manufacturer n
## 1                      audi 3
## 2                  chevrolet 4
## 3                      dodge 4
## 4                       ford 4
## 5                      honda 1
## 6                    hyundai 2
## 7                       jeep 1
## 8                 land rover 1
## 9                    lincoln 1
## 10                   mercury 1
## 11                    nissan 3
## 12                   pontiac 1
## 13                    subaru 2
```

```
## 14                    toyota 6
## 15                volkswagen 4
```

```
names(unique_count) <- c("Manufacturer", "Number of Models")
unique_count
```

```
##     Manufacturer Number of Models
## 1           audi                3
## 2      chevrolet                4
## 3          dodge                4
## 4           ford                4
## 5          honda                1
## 6        hyundai                2
## 7           jeep                1
## 8     land rover                1
## 9        lincoln                1
## 10       mercury                1
## 11        nissan                3
## 12       pontiac                1
## 13        subaru                2
## 14        toyota                6
## 15    volkswagen                4
```

```
ggplot(unique_count, aes(x = Manufacturer, y = `Number of Models`)) +
geom_bar(stat = "identity", fill = "violet")
```
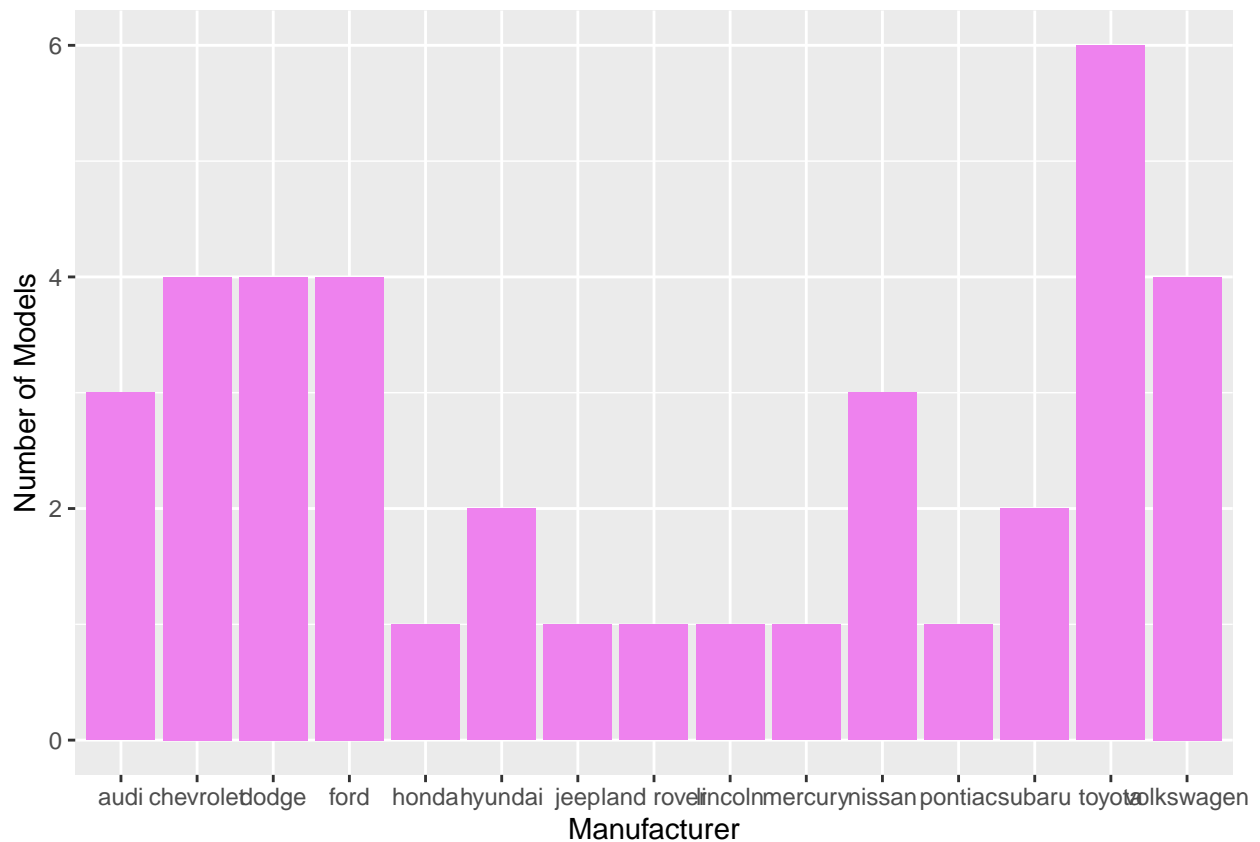

2.Same dataset will be used. You are going to show the relationship of the modeland the manufacturer.

2a.What does ggplot(mpg, aes(model, manufacturer)) + geom_point() show?

```
library(ggplot2)
ggplot(open_mpg, aes(model, manufacturer)) + geom_point()
```
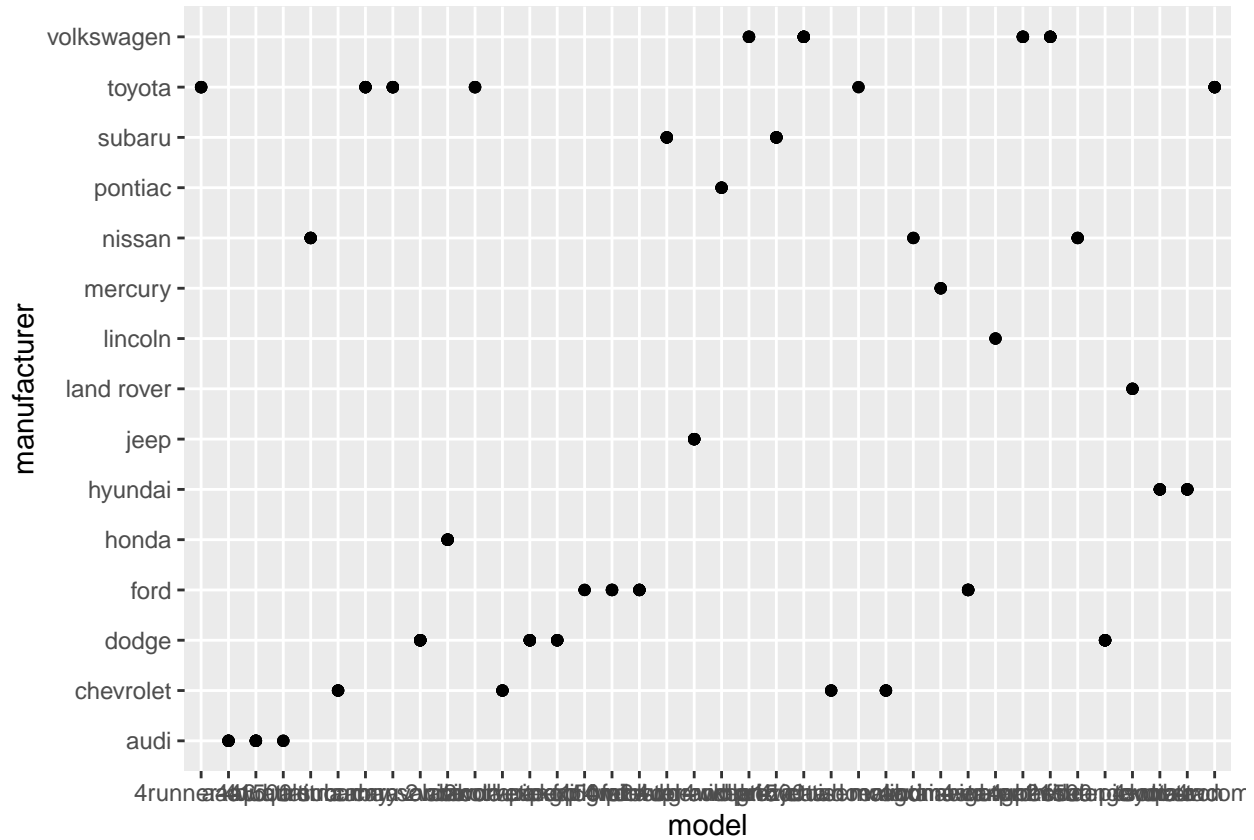

ans. Plots the mpgdataset with model on the x-axis and manufacturer on the y-axis. Each point represents a car model

2b. For you, is it useful? If not, how could you modify the data to make it more informative?

It's useful to know how many models each manufacturer produces. To make it more interesting, I can color code each point based on the class variable and add a label using the cty variable.

3. Plot the model and the year using ggplot(). Use only the top 20 observations. Write the codes and its results.

```
library(ggplot2)

Aobj <-head(open_mpg, 20)
Aobj
```

```
##    X manufacturer       model displ year cyl       trans drv cty hwy fl
## 1  1         audi          a4   1.8 1999   4    auto(l5)   f  18  29  p
## 2  2         audi          a4   1.8 1999   4  manual(m5)   f  21  29  p
## 3  3         audi          a4   2.0 2008   4  manual(m6)   f  20  31  p
## 4  4         audi          a4   2.0 2008   4    auto(av)   f  21  30  p
## 5  5         audi          a4   2.8 1999   6    auto(l5)   f  16  26  p
## 6  6         audi          a4   2.8 1999   6  manual(m5)   f  18  26  p
## 7  7         audi          a4   3.1 2008   6    auto(av)   f  18  27  p
## 8  8         audi   a4 quattro   1.8 1999   4  manual(m5)   4  18  26  p
## 9  9         audi   a4 quattro   1.8 1999   4    auto(l5)   4  16  25  p
## 10 10        audi   a4 quattro   2.0 2008   4  manual(m6)   4  20  28  p
```

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```
## 11 11       audi       a4 quattro   2.0 2008   4    auto(s6)   4  19  27  p
## 12 12       audi       a4 quattro   2.8 1999   6    auto(l5)   4  15  25  p
## 13 13       audi       a4 quattro   2.8 1999   6 manual(m5)    4  17  25  p
## 14 14       audi       a4 quattro   3.1 2008   6    auto(s6)   4  17  25  p
## 15 15       audi       a4 quattro   3.1 2008   6 manual(m6)    4  15  25  p
## 16 16       audi       a6 quattro   2.8 1999   6    auto(l5)   4  15  24  p
## 17 17       audi       a6 quattro   3.1 2008   6    auto(s6)   4  17  25  p
## 18 18       audi       a6 quattro   4.2 2008   8    auto(s6)   4  16  23  p
## 19 19   chevrolet c1500 suburban 2wd 5.3 2008   8    auto(l4)   r  14  20  r
## 20 20   chevrolet c1500 suburban 2wd 5.3 2008   8    auto(l4)   r  11  15  e
##      class
## 1  compact
## 2  compact
## 3  compact
## 4  compact
## 5  compact
## 6  compact
## 7  compact
## 8  compact
## 9  compact
## 10 compact
## 11 compact
## 12 compact
## 13 compact
## 14 compact
## 15 compact
## 16 midsize
## 17 midsize
## 18 midsize
## 19     suv
## 20     suv
```

```r
ggplot(data = Aobj, aes(x = year, y = model, color = as.factor(model))) +
 geom_point(alpha = 0.7) +
 labs(title = "Relationship between Model, Year, and Manufacturer",
      x = "Year",
      y = "Model",
      color = "Manufacturer") +
 theme_minimal()
```

Relationship between Model, Year, and Manufacturer
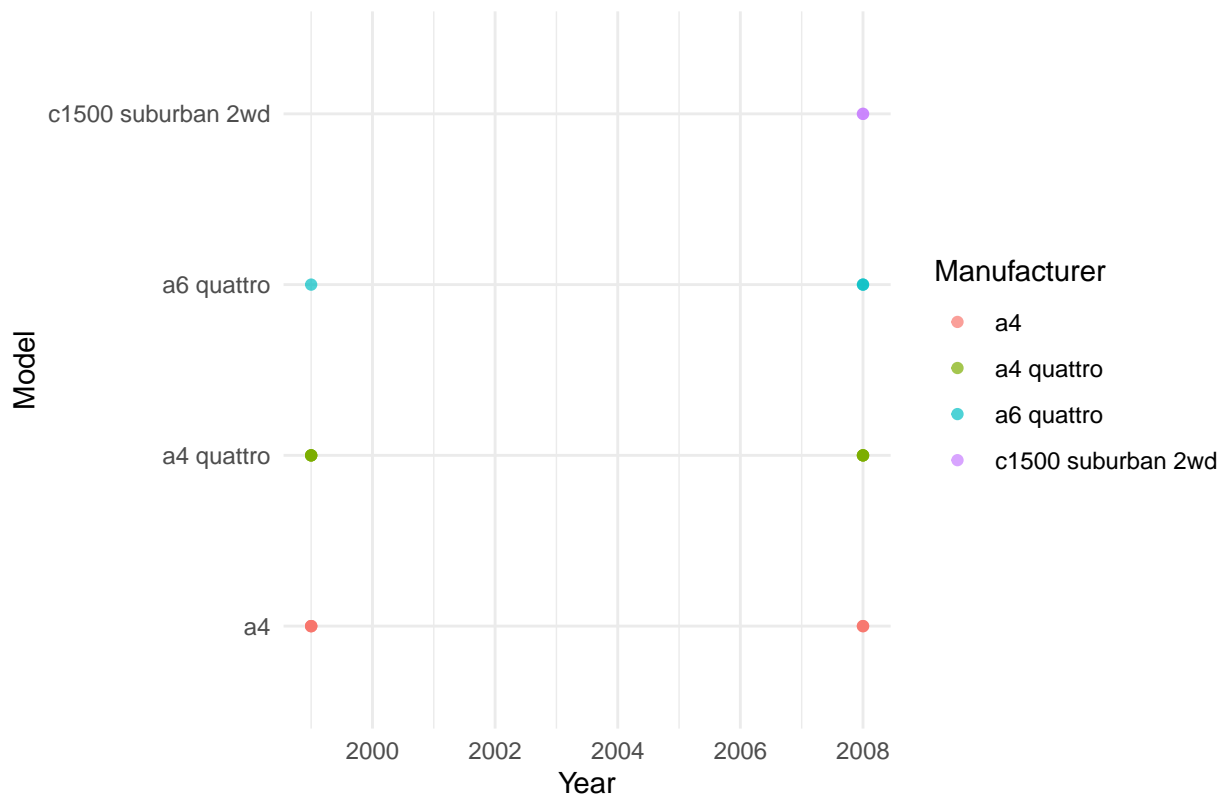
4. Using the pipe (%>%), group the model and get the number of cars per model. Show codes and its result.

```r
library(dplyr)
library(ggplot2)

head(open_mpg, 20)
```

```
##     X manufacturer            model displ year cyl         trans drv cty hwy fl
## 1   1         audi               a4   1.8 1999   4     auto(l5)   f  18  29  p
## 2   2         audi               a4   1.8 1999   4   manual(m5)   f  21  29  p
## 3   3         audi               a4   2.0 2008   4   manual(m6)   f  20  31  p
## 4   4         audi               a4   2.0 2008   4     auto(av)   f  21  30  p
## 5   5         audi               a4   2.8 1999   6     auto(l5)   f  16  26  p
## 6   6         audi               a4   2.8 1999   6   manual(m5)   f  18  26  p
## 7   7         audi               a4   3.1 2008   6     auto(av)   f  18  27  p
## 8   8         audi       a4 quattro   1.8 1999   4   manual(m5)   4  18  26  p
## 9   9         audi       a4 quattro   1.8 1999   4     auto(l5)   4  16  25  p
## 10 10         audi       a4 quattro   2.0 2008   4   manual(m6)   4  20  28  p
## 11 11         audi       a4 quattro   2.0 2008   4     auto(s6)   4  19  27  p
## 12 12         audi       a4 quattro   2.8 1999   6     auto(l5)   4  15  25  p
## 13 13         audi       a4 quattro   2.8 1999   6   manual(m5)   4  17  25  p
## 14 14         audi       a4 quattro   3.1 2008   6     auto(s6)   4  17  25  p
## 15 15         audi       a4 quattro   3.1 2008   6   manual(m6)   4  15  25  p
## 16 16         audi       a6 quattro   2.8 1999   6     auto(l5)   4  15  24  p
## 17 17         audi       a6 quattro   3.1 2008   6     auto(s6)   4  17  25  p
## 18 18         audi       a6 quattro   4.2 2008   8     auto(s6)   4  16  23  p
## 19 19    chevrolet c1500 suburban 2wd   5.3 2008   8     auto(l4)   r  14  20  r
```

```
## 20 20   chevrolet c1500 suburban 2wd   5.3 2008   8   auto(l4)   r  11  15  e
##      class
## 1  compact
## 2  compact
## 3  compact
## 4  compact
## 5  compact
## 6  compact
## 7  compact
## 8  compact
## 9  compact
## 10 compact
## 11 compact
## 12 compact
## 13 compact
## 14 compact
## 15 compact
## 16 midsize
## 17 midsize
## 18 midsize
## 19     suv
## 20     suv
```

```r
open_mpg %>%
 group_by(model) %>%
 summarize(count = n()) -> grouped_open_mpg


grouped_open_mpg
```

```
## # A tibble: 38 x 2
##    model             count
##    <chr>             <int>
##  1 4runner 4wd           6
##  2 a4                    7
##  3 a4 quattro            8
##  4 a6 quattro            3
##  5 altima                6
##  6 c1500 suburban 2wd    5
##  7 camry                 7
##  8 camry solara          7
##  9 caravan 2wd          11
## 10 civic                 9
## # i 28 more rows
```

4a. Plot using geom_bar() using the top 20 observations only. The graphs should have a title, labels and colors. Show code and results.

```r
mpg_observation_top20 <- head(grouped_open_mpg, 20)

mpg_observation_top20  <- ggplot(mpg_observation_top20, aes(x = model, y = count, fill = model)) +
  geom_bar(stat = "identity") +
  labs(title = "Number of Cars per Model",
       x = "Model" ,
       y = "Number of cars")
```

```
mpg_observation_top20
```


Number of Cars per Model
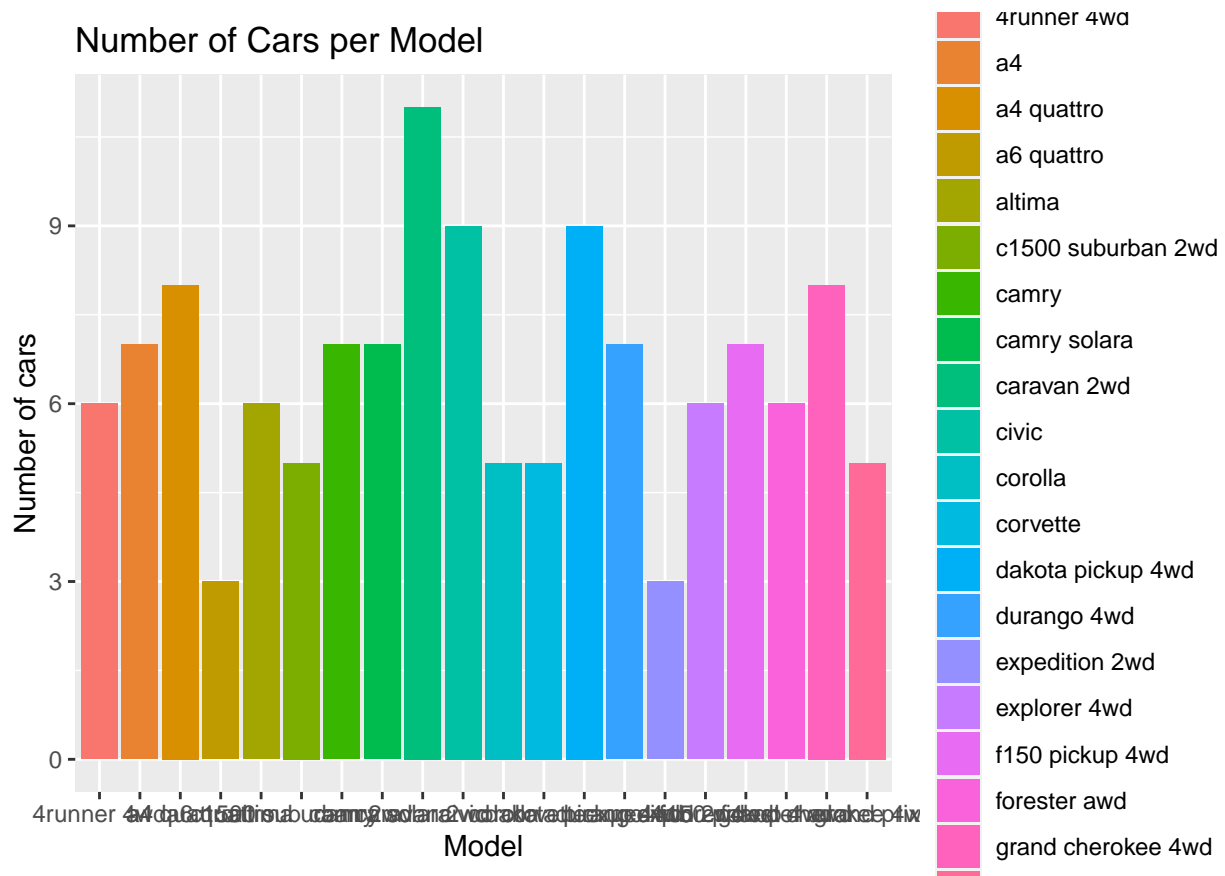
4b. Plot using the geom_bar() + coord_flip() just like what is shown below. Show codes and its result.

```
library(ggplot2)
mpg_top20 <- ggplot(grouped_open_mpg, aes(x = model, y = count, fill = model)) +
  geom_bar(stat = "identity") +
  labs(title = "Number of Cars per Model",
       x = "Model" ,
       y = "Number of cars") +
  coord_flip()

mpg_top20
```
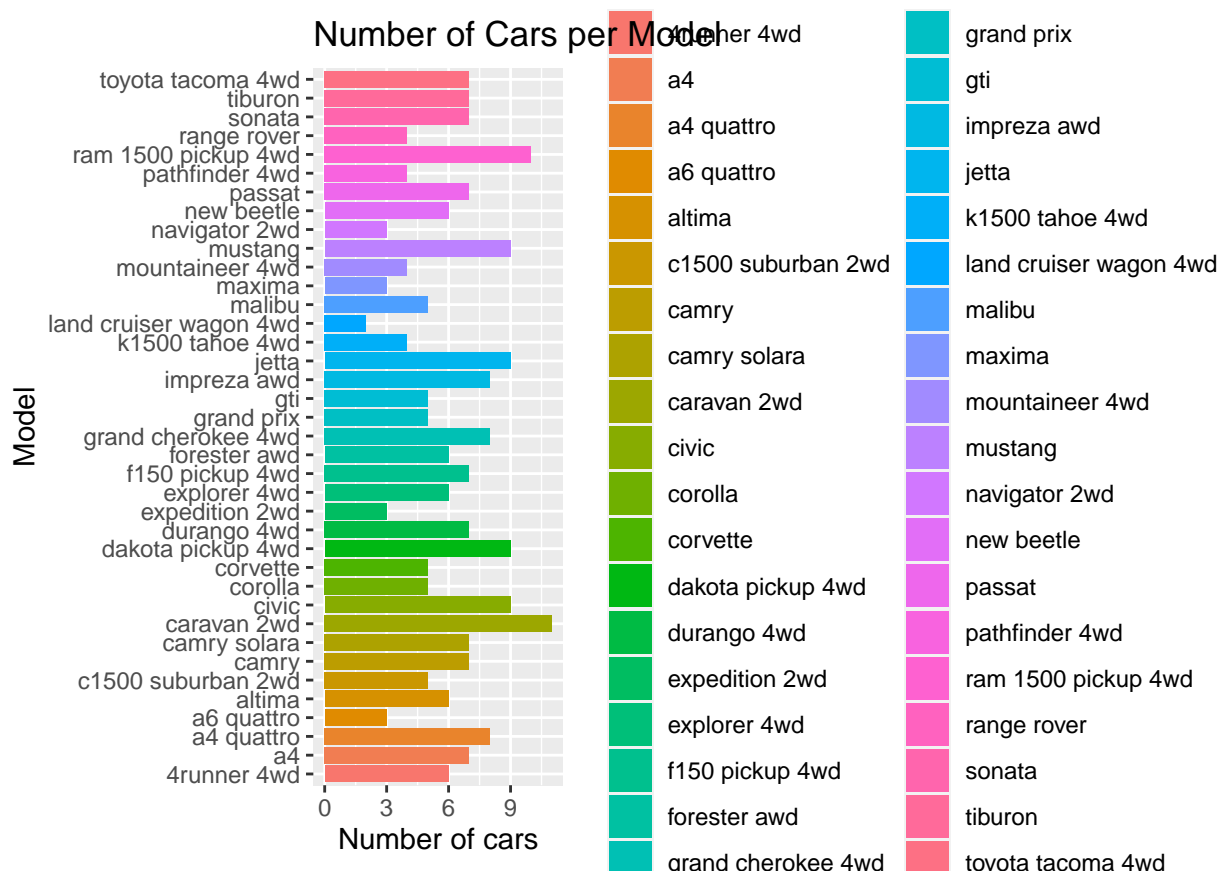
5.Plot the relationship between cyl - number of cylinders and displ - engine displacement using geom_point with aesthetic color = engine displacement. Title should be "Relationship between No. of Cylinders and Engine Displacement".

```
relationship_cyl_displ <- ggplot(open_mpg, aes(x = cyl,
                                                y = displ,
                                                color = displ)) +
  geom_point() +
  labs(title = "Relationship between No. of Cylinders and Engine Displacement",
       x = "Number of Cylinders",
       y = "Engine Displacement")

relationship_cyl_displ
```

Relationship between No. of Cylinders and Engine Displacement
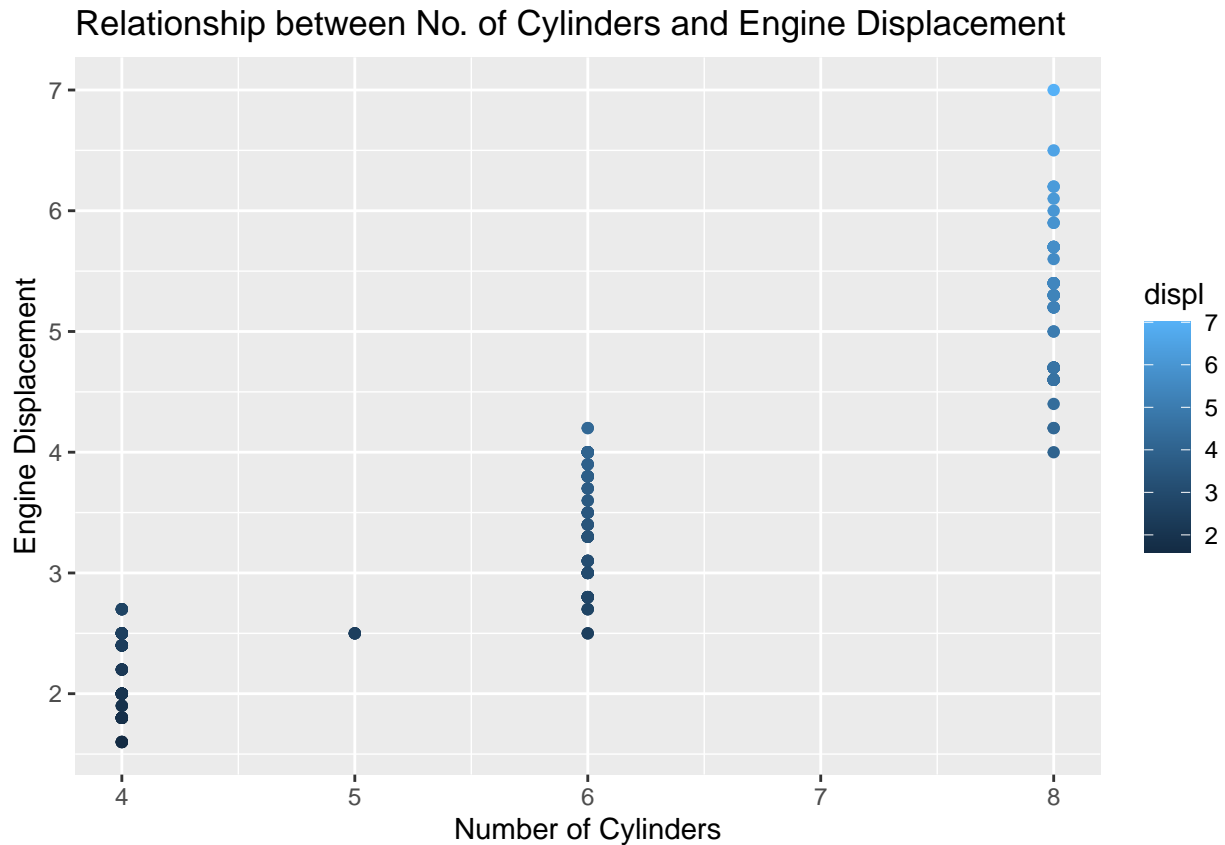
5a. How would you describe its relationship? Show the codes and its result.

The scatter figure illustrates the relationship between engine displacement and cylinder count, showing that larger engines with more cylinders often have higher displacement. As cylinder count increases, so does the displacement.

6. Plot the relationship between displ (engine displacement) and hwy(highway miles per gallon). Mapped it with a continuous variable you have identified in #1-c. What is its result? Why it produced such output?

```
displ_hwy_relationship <- ggplot(open_mpg, aes(x = displ, y = hwy, color = cty)) +
  geom_point() +
  labs(title = "Relationship between Engine Displacement and Highway MPG",
       x = "Engine Displacement",
       y = "Highway MPG")

displ_hwy_relationship
```

Relationship between Engine Displacement and Highway MPG
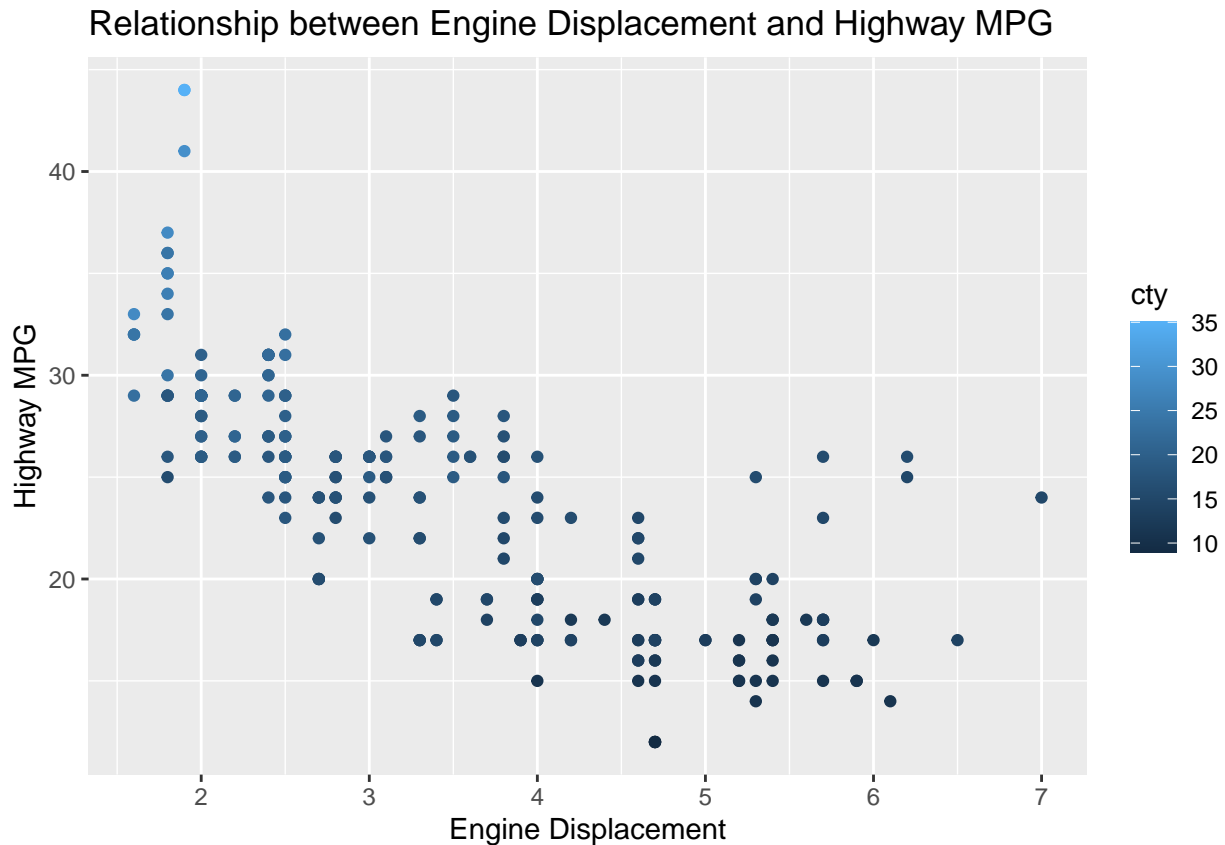
Each point in the scatterplot represents a city's fuel efficiency, and it displays the relationship between engine displacement and highway miles per gallon. Insight into vehicle fuel efficiency for various engine sizes can be gained by visualizing the relationship between various city fuel efficiency levels and displ and hwy.

6.Import the traffic.csv onto your R environment.

a.How many numbers of observation does it have? What are the variables of the traffic dataset the Show your answer.

```r
library(readr)
traffic <- read.csv("traffic.csv")

num_obs <- nrow(traffic)
num_obs
```

```
## [1] 48120
```

```r
num_vars <- ncol(traffic)
num_vars
```

```
## [1] 4
```

```r
vars <- colnames(traffic)
vars
```

```
## [1] "DateTime" "Junction" "Vehicles" "ID"
```

6b. subset the traffic dataset into junctions. What is the R codes and its output?

```r
junctions_subset1 <- subset(traffic, Junction == 1)

junctions_subset2 <- subset(traffic, Junction == 2)
```

```
junctions_subset3 <- subset(traffic, Junction == 3)

junctions_subset4 <- subset(traffic, Junction == 4)
```

6c.Plot each junction in a using geom_line(). Show your solution and output.
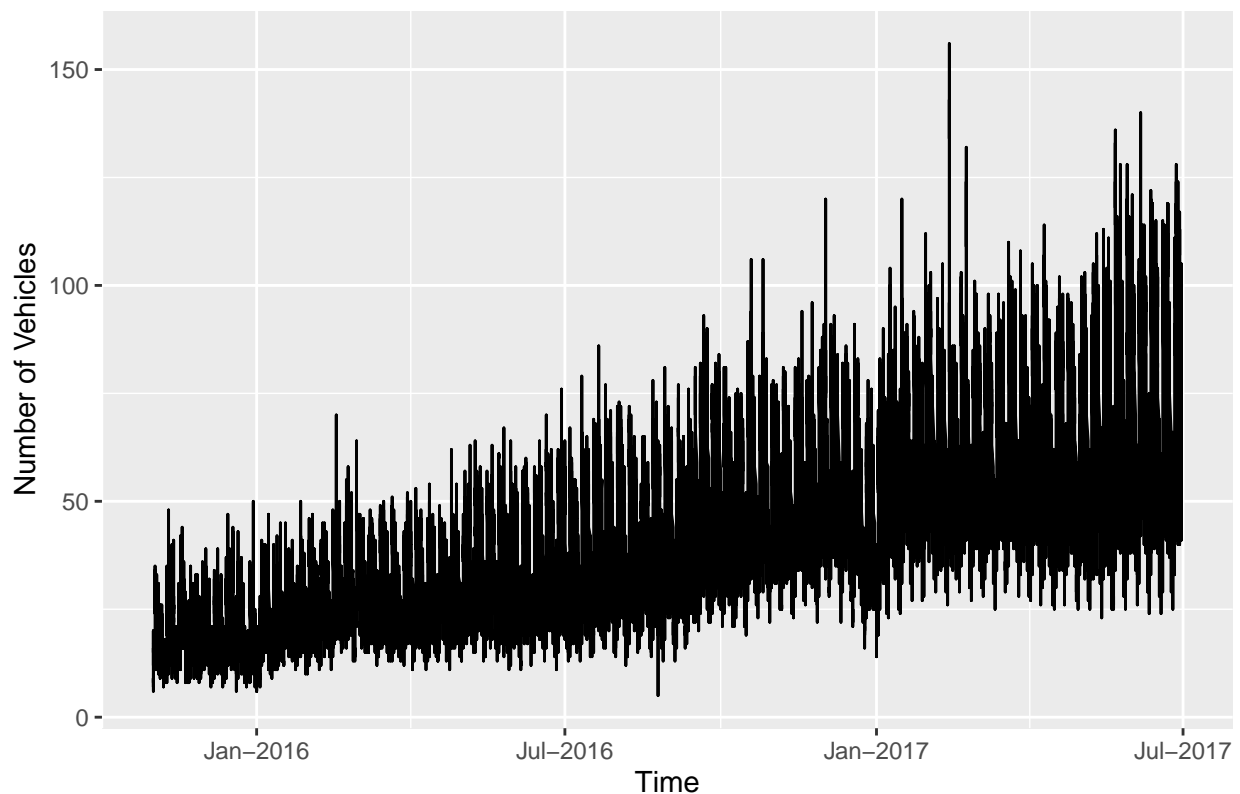
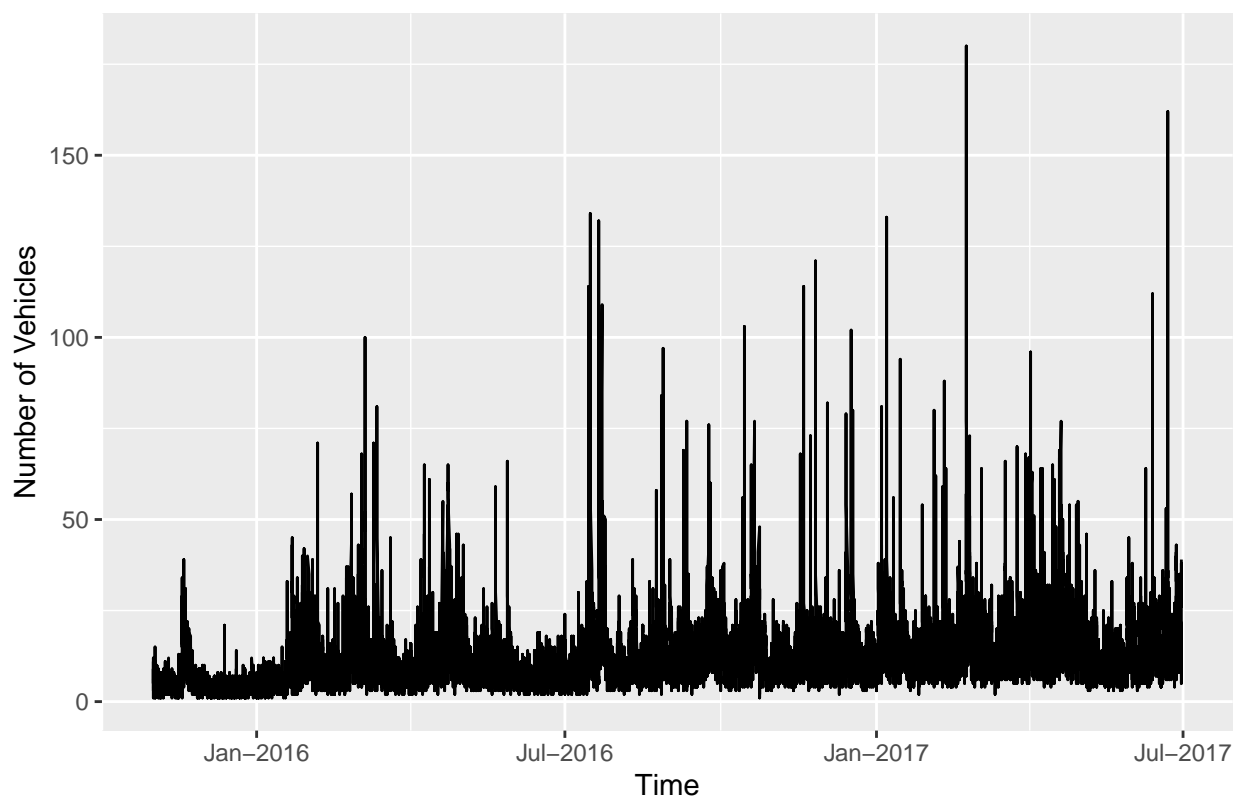```
junction_plot_1 <- ggplot(junctions_subset1,
                          aes(x = as.Date(junctions_subset1$DateTime),
                              y = Vehicles)) +
  geom_line() +
  scale_x_date(date_labels = "%b-%Y") + theme(legend.position = "none") +
  labs(title = "Junction 1", x = "Time", y = "Number of Vehicles")

junction_plot_1
```

```
## Warning: Use of `junctions_subset1$DateTime` is discouraged.
## i Use `DateTime` instead.
```


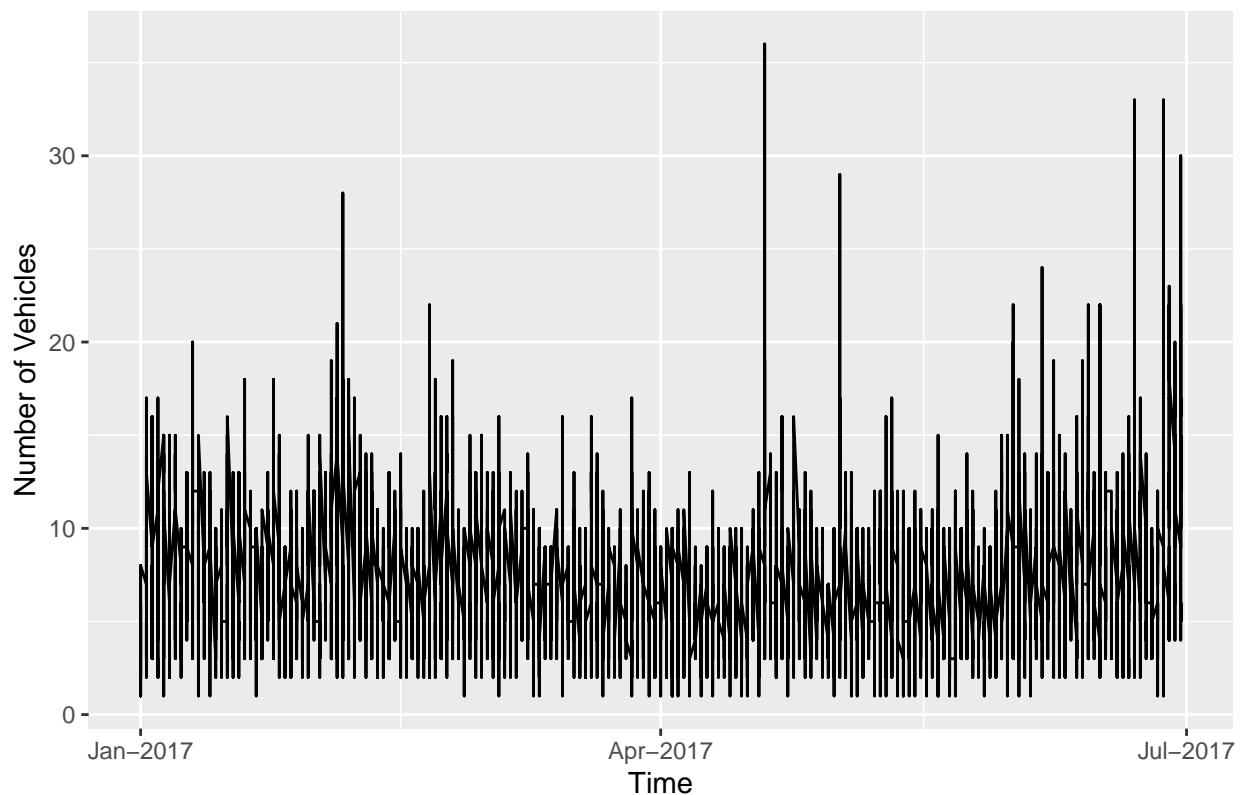```
junction_plot_2 <- ggplot(junctions_subset2,
                          aes(x = as.Date(junctions_subset2$DateTime),
                              y = Vehicles)) +
  geom_line() +
  scale_x_date(date_labels = "%b-%Y") + theme(legend.position = "none") +
  labs(title = "Junction 2", x = "Time", y = "Number of Vehicles")

junction_plot_2
```
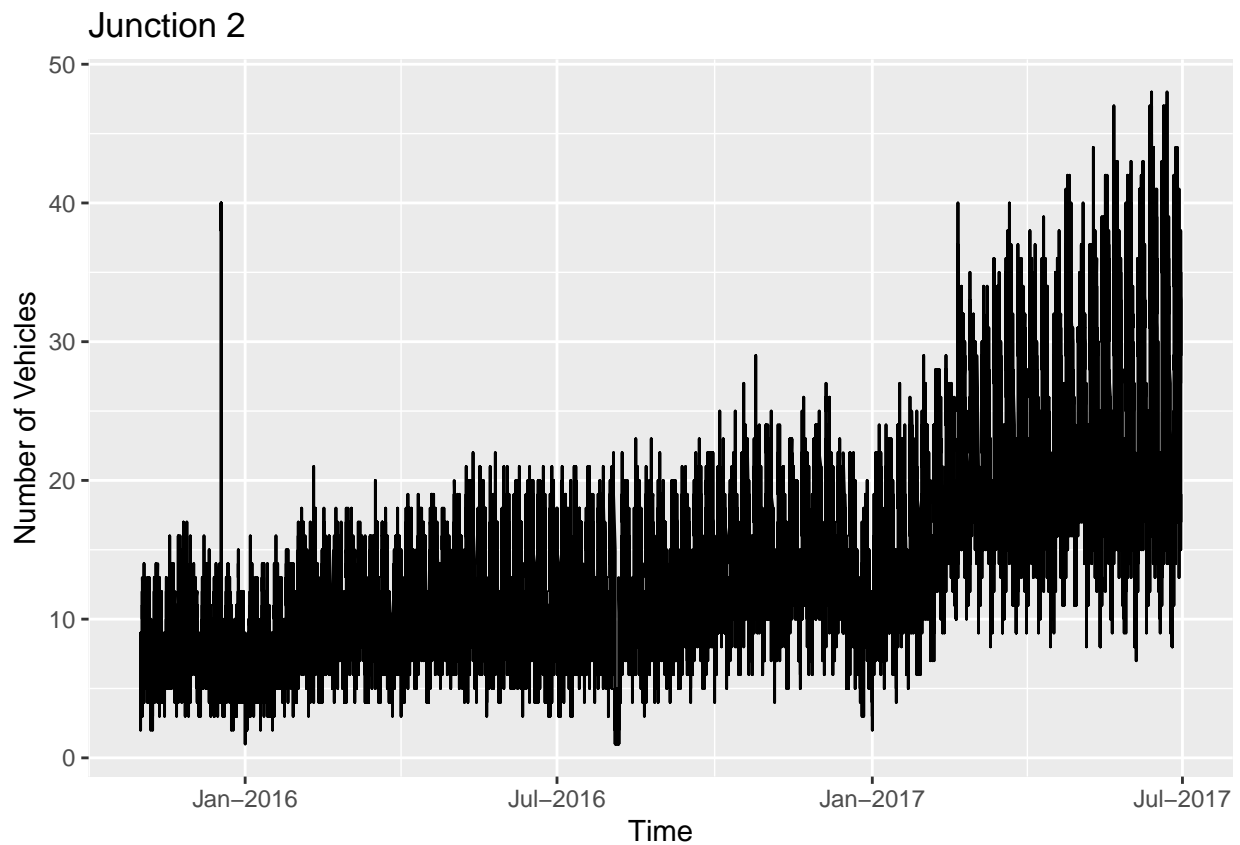
Junction 2


```
junction_plot_3 <- ggplot(junctions_subset3,
                          aes(x = as.Date(junctions_subset3$DateTime),
                              y = Vehicles)) +
  geom_line() +
  scale_x_date(date_labels = "%b-%Y") + theme(legend.position = "none") +
  labs(title = "Junction 3", x = "Time", y = "Number of Vehicles")

junction_plot_3
```

Junction 3


```
junction_plot_4 <- ggplot(junctions_subset4,
                          aes(x = as.Date(junctions_subset4$DateTime),
                              y = Vehicles)) +
  geom_line() +
  scale_x_date(date_labels = "%b-%Y") + theme(legend.position = "none") +
  labs(title = "Junction 4", x = "Time", y = "Number of Vehicles")

junction_plot_4
```

Junction 4

A time series plot titled "Junction 4" with x-axis labeled "Time" (ranging Jan–2017 to Jul–2017) and y-axis labeled "Number of Vehicles" (0 to ~35).

7. Moving alexa_file from my rworksheet 4b to 4c.

install.packages() install.packages()

library() library() file.move("/cloud/project/Rworksheet4/rworksheet4c_camayodo/alexa_file_.xlsx")

7a.How many observations does alexa_file has? What about the number of columns? Show your solution and answer.

```
library(readxl)

open_alexa_data <- read_excel("/cloud/project/Rworksheet4/rworksheet4c_camayodo/alexa_file_.xlsx")

num_obs <- nrow(open_alexa_data)
num_obs
```

```
## [1] 3150
```

```
num_cols <- ncol(open_alexa_data)
num_cols
```

```
## [1] 5
```

7b. group the variations and get the total of each variations. Use dplyr package. Show solution and answer

```
var_counts <- open_alexa_data %>%
  count(variation)

var_counts
```

```
## # A tibble: 16 x 2
##    variation                n
```

```
##      <chr>                          <int>
##  1 Black                              261
##  2 Black   Dot                        516
##  3 Black   Plus                       270
##  4 Black   Show                       265
##  5 Black   Spot                       241
##  6 Charcoal Fabric                    430
##  7 Configuration: Fire TV Stick       350
##  8 Heather Gray Fabric                157
##  9 Oak Finish                          14
## 10 Sandstone Fabric                    90
## 11 Walnut Finish                        9
## 12 White                               91
## 13 White   Dot                        184
## 14 White   Plus                        78
## 15 White   Show                        85
## 16 White   Spot                       109
```

7c. Plot the variations using the ggplot() function. What did you observe? Complete the details of the graph. Show solution and answer.

```
plot_alexafile <- ggplot(open_alexa_data, aes(x = variation)) +
  geom_bar(fill = "violet") +
  labs(title = "Variations",
       x = "Variation",
       y = "Count")

plot_alexafile
```
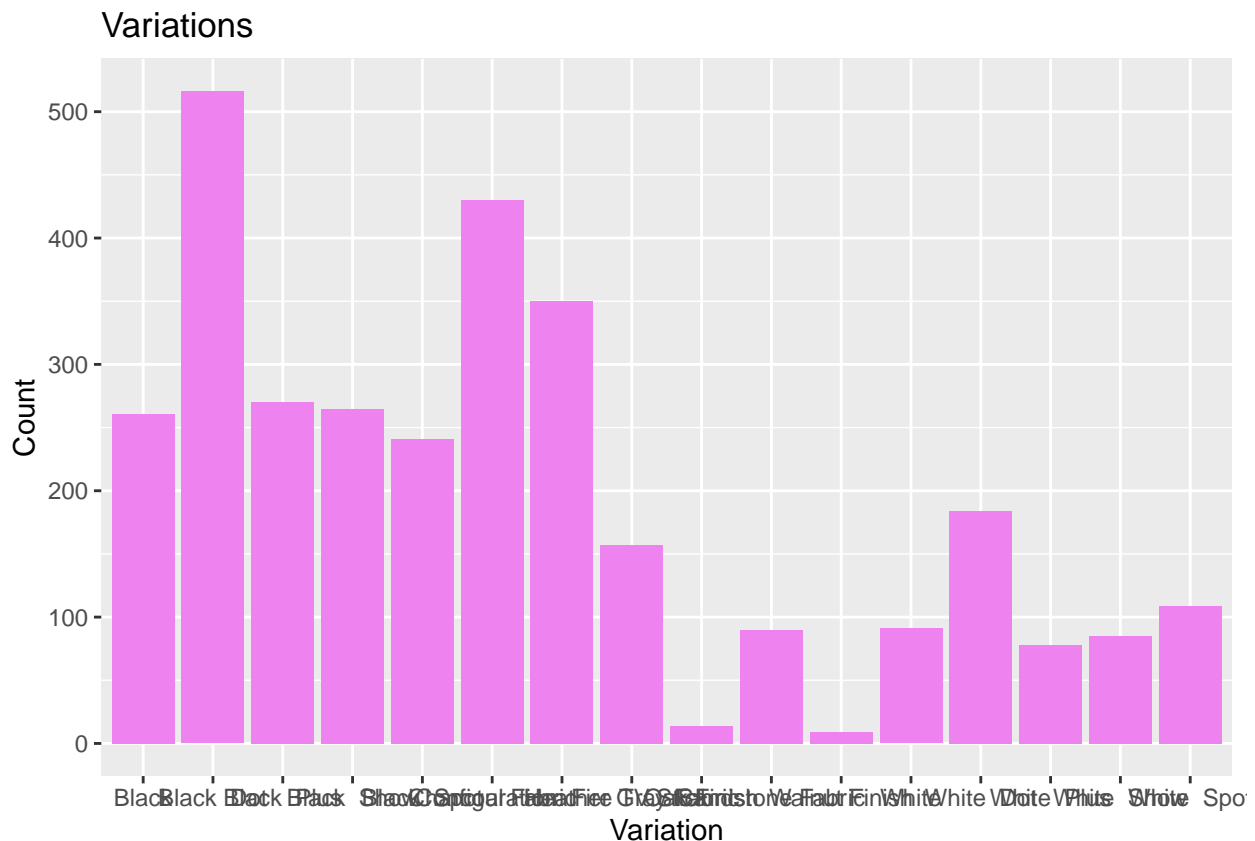
The graph displays the distribution of variations and their counts, with each bar representing a specific variation and the height representing the count of that variation.

7d. Plot a geom_line() with the date and the number of verified reviews. Complete the details of the graphs. Show your answer and solution.

```
library(dplyr)

open_alexa_data$date <- as.Date(open_alexa_data$date)

open_alexa_data$month <- format(open_alexa_data$date, "%m")

alexa_Month <-open_alexa_data%>%
  count(month)
alexa_Month
```
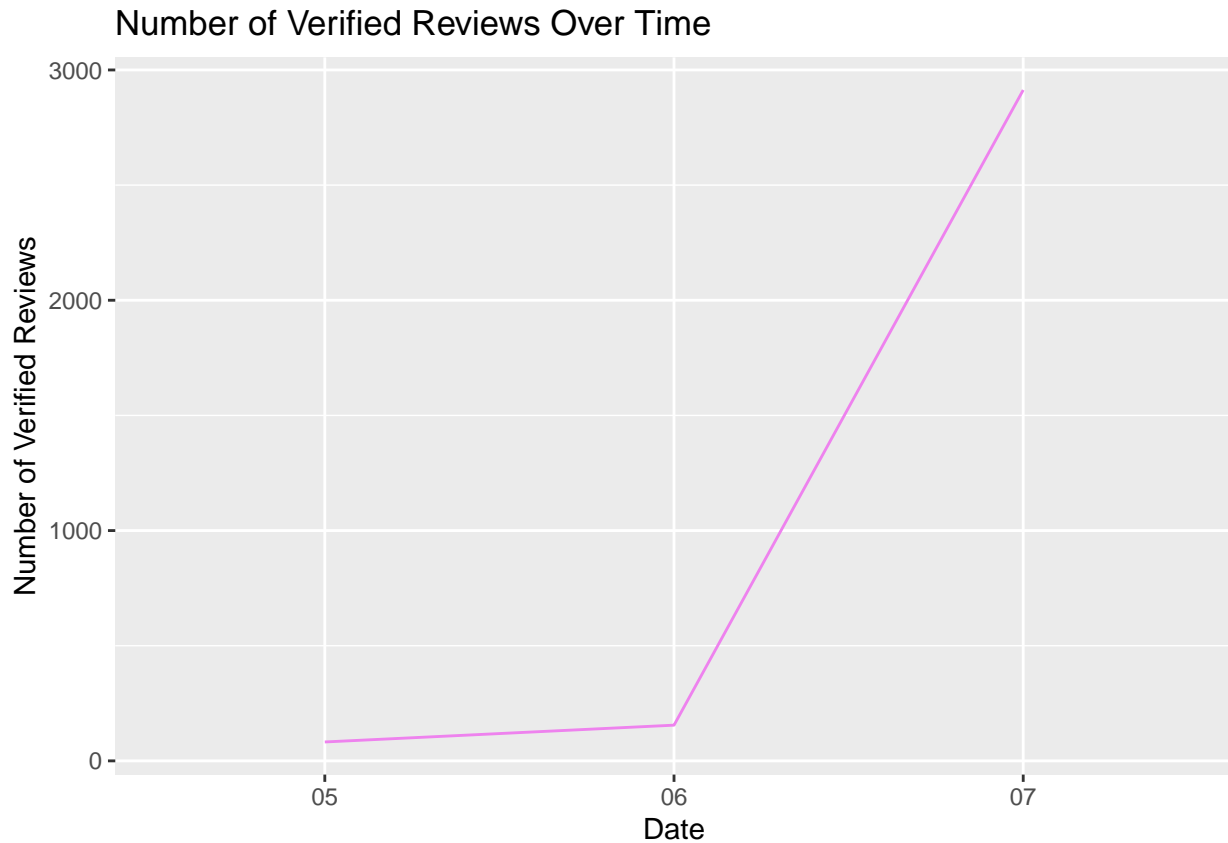
```
## # A tibble: 3 x 2
##   month     n
##   <chr> <int>
## 1 05       82
## 2 06      155
## 3 07     2913
```

```
alexa_monthly_reviews <- table(alexa_Month)
alexa_monthly_reviews
```

```
##        n
## month 82 155 2913
##    05  1   0    0
##    06  0   1    0
##    07  0   0    1
```

```
alexa_lineplot <- ggplot(alexa_Month, aes(x = month, y = n, group = 1)) +
  geom_line(color = "violet") +
  labs(title = "Number of Verified Reviews Over Time",
       x = "Date",
       y = "Number of Verified Reviews")

alexa_lineplot
```

Number of Verified Reviews Over Time

7e. Get the relationship of variations and ratings. Which variations got the most highest in rating? Plot a graph to show its relationship. Show your solution and answer.

```
alexa_variation_ratings <- open_alexa_data %>%
  group_by(variation) %>%
  summarise(avg_rating = mean(rating))

alexa_variation_ratings
```

```
## # A tibble: 16 x 2
##     variation                  avg_rating
##     <chr>                           <dbl>
##   1 Black                            4.23
##   2 Black  Dot                       4.45
##   3 Black  Plus                      4.37
##   4 Black  Show                      4.49
##   5 Black  Spot                      4.31
##   6 Charcoal Fabric                  4.73
##   7 Configuration: Fire TV Stick     4.59
##   8 Heather Gray Fabric              4.69
##   9 Oak Finish                       4.86
## 10 Sandstone Fabric                  4.36
## 11 Walnut Finish                     4.89
## 12 White                            4.14
## 13 White  Dot                       4.42
## 14 White  Plus                      4.36
## 15 White  Show                      4.28
## 16 White  Spot                      4.31
```

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```
highest_ratings <- alexa_variation_ratings %>%
  filter(avg_rating == max(avg_rating))

highest_ratings
```

```
## # A tibble: 1 x 2
##   variation      avg_rating
##   <chr>               <dbl>
## 1 Walnut Finish        4.89
```

```
# The walnut finish variation has the highest rating

ggplot(alexa_variation_ratings, aes(x = variation, y = avg_rating)) +
  geom_bar(stat = "identity", fill = "violet") +
  labs(title = "Average Ratings by Variation",
       x = "Variation",
       y = "Average Rating")
```